

## ABSTRACT

Methods and compositions are provided for the chemical mechanical planarization of ruthenium. The method includes polishing the ruthenium layer using a low contact pressure and exposing the ruthenium layer to a planarization composition while polishing. The planarization composition comprises a dispersing medium and a plurality of abrasive particles. The method further includes removing the ruthenium of the ruthenium layer as a ruthenium hydroxide if the pH of the composition is in the range of from about 8 to about 12. The planarization composition may further comprise an oxidizing agent, with the ruthenium removed as a ruthenium hydroxide if the pH of the composition is in the range of from about 2 to about 14. The planarization composition may further comprise a complexing agent, with the ruthenium transformed into an ionic state and removed as a ruthenium complex if the pH of the composition is no greater than about 2.5.